

MEMORANDUM OF AGREEMENT  
BETWEEN  
THE UNITED STATES DEPARTMENT OF ENERGY  
AND  
THE POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION, JAPAN  
IN THE AREA OF  
CRITICALITY DATA DEVELOPMENT

This Agreement is made as of the 12th day of August  
1983 between the United States Department of Energy (DOE) and  
the Power Reactor and Nuclear Fuel Development Corporation,  
Japan (PNC), hereinafter called the "Parties."

WHEREAS

DOE and PNC have agreed to cooperate in selected areas of fast  
breeder reactor technology including the fuel cycle under  
their Agreement in the Field of Liquid Metal-Cooled Fast  
Breeder Reactors of January 31, 1979, hereinafter called the  
"DOE/PNC LMFBR Agreement."

Both DOE and PNC have a mutual interest in the conduct of  
studies of the nuclear criticality aspects of fuel material  
facilities associated with the LMFBR.

DOE has the means for the experimental and analytical verification of nuclear criticality at its Pacific Northwest Laboratory (PNL), its Los Alamos National Laboratory (LANL), and elsewhere.

Both the United States and Japan are parties to the Treaty on Nonproliferation of Nuclear Weapons and, therefore, have as a mutual interest the development of nuclear energy in such a manner as to enhance prospects for restraining the proliferation of nuclear weapons.

IT IS AGREED AS FOLLOWS

#### ARTICLE 1 - OBJECTIVE

The objectives of cooperation under this Agreement are to verify computer code calculations of nuclear criticality, to measure the reactivity of subcritical configurations, and to measure the neutron energy spectra for various configurations of materials and geometries.

ARTICLE 2 - PROGRAM

1. The Parties have agreed on a Joint Program designed to achieve the objectives of this Agreement, hereinafter called the "Program," which is outlined in Appendix A to this Agreement. Any changes to the Program shall require the prior agreement in writing of the Parties.
2. The Program shall constitute a Joint Project of the type contemplated by Article 3, Paragraph 7, of the DOE/PNC LMFBR Agreement. Unless otherwise specified in this Agreement, cooperation under this Agreement shall be subject to applicable provisions of the DOE/PNC LMFBR Agreement. The provisions of Article 10 (Exchange of Equipment), Article 11 (Exchange of Personnel), and Article 12 (Damages) of the DOE/PNC LMFBR Agreement are hereby incorporated in this Agreement.
3. In summary, the Program envisages:
  - a. Performance at DOE critical experiment facilities of the 24 items of verification of computer code calculations in the areas listed in Table 1 to Appendix A.
  - b. Use of techniques developed by DOE to measure the reactivity of subcritical configurations of materials in the areas listed in Table 1 to Appendix A.

- c. Performance of additional experiments in neutron spectrum measurement in the areas listed in Table 1 to Appendix A, if requested by PNC and subject to amendment to this Agreement.
- d. Recording and exchange between the Parties of agreed data and results arising from the Program.
- e. Analysis of the experimental results by each Party and agreed exchange between the Parties of the results of such analysis.
- f. The completion of all work by March 31, 1986.

#### ARTICLE 3 - RESPONSIBILITIES

- 1. DOE shall be responsible for:
  - a. Scheduling and conducting the 24 items of verification listed in Table 1 to Appendix A.
  - b. Recording the experimental data arising from the Program and making them available to PNC.
  - c. Analyzing the experimental data arising from the Program, using its own codes, and making the results available to PNC.

- d. Preparing and issuing quarterly and final reports and, as mutually agreed, topical reports concerning the work performed under the Program.
  - e. Providing personnel support, office space, and unclassified access to computing facilities for any PNC staff attached to DOE or DOE contractors under this Agreement.
2. PNC shall be responsible for:
- a. Sharing in the cost of the Program by providing financial contributions as described in Article 5 of this Agreement.
  - b. Providing to DOE for use in the Program an annular tank, a boiler tube, and related equipment, designed to DOE specifications, subject to the provisions of Article 10 of the DOE/PNC LMFBR Agreement.
  - c. Analyzing the experimental data arising from the Program, using its own codes, and making the results available to DOE.

3. PNC shall have the right to participate in the planning of the experiments and measurements to be conducted at DOE facilities under the Program, and shall have the right to participate in the analysis of the results of such experiments and measurements. These rights may be exercised by short term visits or by attachment of staff, subject to the prior approval of DOE on each occasion. Attachment of staff shall be the subject of separate attachment agreements in respect of each person, in accordance with Article 11 of the DOE/PNC LMFBR Agreement. Not more than two PNC staff shall be attached to any one DOE facility at any one time.
4. DOE may arrange, at its own discretion, for PNC staff to observe selected experiments, on terms and conditions as agreed in writing by the Parties.
5. DOE and PNC each propose to undertake analysis of the results arising from the Program according to its own requirements, using its own codes and at its own expense. However, each Party shall inform the other Party of its intentions in this respect, so as to provide for the possibility of cooperation between the Parties on appropriate aspects of analysis. Each Party shall make available to the other Party the results of analyses, and the Parties shall cooperate in attempts to establish the reasons for any differences between results of analyses.

1. The Joint DOE/PNC Coordinating Committee established pursuant to Article 4 of the DOE/PNC LMFBR Agreement shall be responsible for the review, evaluation, and assessment of the Program.
2. For periods between meetings of the Joint DOE/PNC Coordinating Committee, each Party shall designate one or more persons to act on its behalf in all matters concerning cooperation under this Agreement.

#### ARTICLE 5 - FINANCIAL TERMS

1. In consideration of the materials and services to be provided by DOE under the Program, PNC agrees to provide to DOE a financial contribution of \$2,300,000 in U.S. dollars for that portion of the Program to be conducted in Japanese Fiscal Year 1983 (April 1, 1983 to March 31, 1984).
2. Preliminary estimates of PNC contributions in support of the Program for Japanese Fiscal Years 1984 and 1985 are \$2,300,000 and \$1,700,000 U.S. dollars, respectively. However, at least two months prior to the start of each Japanese Fiscal Year 1984 and 1985, the Parties shall negotiate the scope of the Program for that fiscal year, together with the amount of the annual PNC

contribution in support of the Program for that fiscal year, and this Agreement shall be amended to reflect such negotiations. Contributions by PNC shall be provided to DOE in advance of any work to be performed.

3. In the event the actual cost of the agreed Program in any one fiscal year shall vary from the estimated cost for that fiscal year, PNC shall adjust its contribution to DOE to match the actual cost.
4. All contributions by PNC shall be made within 30 days of receipt of invoice, together with detailed instructions for transfer of funds, to be provided to PNC by the DOE Office of the Controller. DOE shall provide quarterly invoices to PNC, and the amounts to be billed by DOE in any one year shall be divided into approximately equal amounts among the four quarterly invoices.
5. Unless otherwise provided in this Agreement, each Party shall bear all costs of its participation in the Program under this Agreement.
6. The ability of each Party to carry out its obligations under this Agreement is subject to the availability of appropriated funds.



## ARTICLE 6 - INFORMATION AND PATENTS

1. DOE shall provide to PNC information necessary to carry out the Program. PNC shall provide to DOE results from its analysis of such information so provided to PNC. PNC shall also provide to DOE all information relating to equipment which PNC shall loan to DOE under this Agreement.
2. All information arising from this Agreement shall be promptly exchanged between the Parties.
3. The application or use of any information provided under or arising from this Agreement shall be the responsibility of the Party receiving it, and the other Party does not warrant the suitability of such information for any particular use or application.
4. The information provided under and arising from this Agreement may be made available to the public by either Party through customary channels and in accordance with the normal procedures of the Parties.
5. Copyrights of either Party or of cooperating organizations shall be accorded treatment consistent with internationally recognized standards of protection.

6. Inventions made or conceived in the course of or under this Agreement (hereinafter referred to as "arising inventions") shall be identified and reported promptly by DOE to PNC. Information regarding inventions on which patent protection is to be obtained shall not be published or publicly disclosed by the Parties until a patent application has been filed in either country of the Parties; provided, however, that this restriction on publication or disclosure shall not extend beyond six months from the date of reporting of the invention. It shall be the responsibility of DOE to mark appropriately reports which disclose inventions that have not been appropriately protected by the filing of a patent application.
7. Arising inventions shall be owned:
  - (1) by PNC in Japan subject to a royalty-free, nonexclusive, irrevocable license to DOE, its Government, and the nationals of its country designated by it; and
  - (2) by DOE in the United States and in third countries, subject to a royalty-free, nonexclusive, irrevocable license to PNC, its Government, and the nationals of its country designated by it.

8. Each Party shall assume the responsibility to pay awards or compensation required to be paid to its own nationals according to its own laws.
9. Each Party shall, without prejudice to any rights of inventors under its national laws, take all necessary steps to provide the cooperation from its inventors required to carry out the provisions of this Article.

#### ARTICLE 7 - LEGAL PROVISIONS

Cooperation under this Agreement shall be in accordance with the laws and regulations of the respective countries of the Parties. All questions related to this Agreement arising during its term shall be settled by mutual agreement of the Parties.

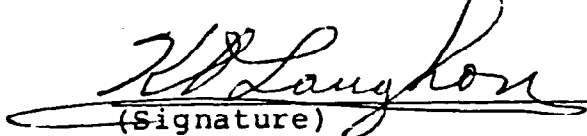
#### ARTICLE 8 - DURATION AND TERMINATION

1. This Agreement shall enter into force upon the later date of signature, and shall continue through March 31, 1986 unless sooner terminated in accordance with paragraph 3 of this Article.
2. This Agreement may be amended or extended, at any time, by mutual written agreement of the Parties.

3. This Agreement may be terminated, at any time, upon 90 days written notice by either Party. Such termination shall be without prejudice to the rights which may have accrued to either Party up to the date of such termination. In the event of such termination, the settlement of payments from PNC to DOE and the furnishing of information and data from DOE to PNC shall be negotiated on a pro-rata basis.

Done in duplicate.

FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

  
(Signature)

Kermit O. Laughon

Name

Director, Office of Spent Fuel Mgt.  
and Reprocessing Systems, Office

Title of Nuclear Energy

June 21, 1983

Date

FOR THE POWER REACTOR AND NUCLEAR  
FUEL DEVELOPMENT CORPORATION, JAPAN

  
(Signature)

Masumichi Koizumi

Name

Director, Technology  
Management Division

Title

August 12, 1983

Date